continuous line array.

REMARKS

Claims 1-10 and 24-33 are remaining in this application. Claims 1-10 and 24-33 have been amended. The Examiner rejected claims 1-10 and 24-33 under 35 USC 012(a) as being clearly anticipated by Toda, Park and Lerch. The Examiner stated,

> Toda (figs. 1, 4, 5, 10 and 11), Park (figs. 5, 6, 8 and 9) and Lerch (figs. 1 and 4) each teach a continuous single piece of piezoelectric polymer having a incompassible (*sic*) support (substrate) with areas of enhanced sensitivity (*unsupported areas). Only a single electric output signal is taken from the piezo element. Note terminals #73, #74, #116, #118 of Lerch; fig. 10 of Toda; fig. 11 or Park. While it is true that the references use multiple electrodes which are interconnected to yield the single output, applicants claims do not prelude such structure. The supported areas would inherently produce an output when compressed even if no electrodes are formed to remove the output.

Applicant respectfully traverses the Examiner's rejection as follows.

While the Examiner states that the supported areas would inherently produce an output when compressed, and a single electrical output is taken from the piezo element in the references, there is no connection in the references cited by the Examiner to sense the entire output of the array with a single connection as in the present invention. Claims 1 and 24 have been amended to include the limitation of forming an array of enhanced sensitivity areas wherein an electrical output of the entire array may be observed with a single pair of connectors, which is not taught or suggested by the references cited by the Examiner. Support for this limitation is found in the specification at page 6, lines 8-11.

Moreover, Claims 2-10 and 25-33 have been amended to include limitations regarding shaping and configuring the areas of increased sensitivity and adjusting the compressibility of adjacent substrate of sensitive areas forming the array to determine the beam pattern, noise level and spectral sensitivity for the array, which are not taught or suggested by the reference cited by the Examiner. Support for these limitations is found in the specification at page 9, lines 4-6, page 10, lines 14-16 and page 11, lines 10-12.

Thus it is believed that the amended claims 1-10 and 24-33 are patentably distinct over the references cited by the Examiner. Pursuant to 37 CFR 1.121, a marked-up set of amended claims showing changes is attached on a separate page.

Respectfully submitted,

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Version with Markings to Show Changes

1. [Thrice Amended] A single element piezoelectric sensor for detecting acoustic seismic data comprising:

a continuous uninterrupted piezoelectric film forming a single piezoelectric element placed on a surface of a relatively incompressible substrate, wherein the piezoelectric film adjacent the relatively incompressible substrate generates an electrical signal substantially sensitive to compression of the piezoelectric film only;

a plurality of areas of relatively compressible substrate formed in the surface of the relatively incompressible substrate adjacent areas within the continuous uninterrupted piezoelectric film, wherein the [area] plurality of areas within the continuous uninterrupted piezoelectric film adjacent the areas of relatively compressible substrate form an array of enhanced sensitivity areas wherein an electrical output of the entire array may be observed with a single pair of connectors; [generates an electrical signal substantially sensitive to stretching of the piezoelectric film adjacent the relatively compressible substrate;] [and]

a single pair of connectors providing access to the [a] [single] electrical output from the [single piece of piezoelectric film] array.

2. [Thrice Amended] The piezoelectric sensor of claim 1 further comprising:

[a plurality of areas of relatively compressible substrate formed in the surface of the relatively incompressible substrate forming a continuous line array of discrete areas of increased sensitivity in the piezoelectric film to impinging acoustic pressure

waves] a beam pattern for the [sensor] array determined by the relationship between each of the shape[s] [and configuration] of each of the areas of relatively incompressible substrate and each of the areas of relatively compressible substrate adjacent the single piece of piezoelectric film comprising the array.

3. [Twice Amended] The piezoelectric sensor of claim 1, further comprising:
a two-dimensional array of areas of relatively compressible substrate formed in the surface of the relatively incompressible substrate forming a two-dimensional continuous line array of areas of increased sensitivity in the piezoelectric film to impinging acoustic pressure waves film having a shapeable beam pattern and selectableresponse:

4. [Amended] The piezoelectric sensor of claim 3, further comprising:
the two-dimensional continuous line array of areas of increased sensitivity are formed into a three-dimensional shape to form a three-dimensional continuous line array of areas of increased sensitivity to impinging acoustic pressure waves in the piezoelectric film having a shapeable beam pattern and selectable response:

5. [Amended] The piezoelectric sensor of claim 1 [2] further comprising:
a shapeable beam pattern for the array shaped by variation in [at least one of a size and] location of the areas of increased sensitivity within the array [to shape the beam pattern of the piezoelectric continuous line array].

6. [Amended] The piezoelectric sensor of claim 1 [2] further comprising:

variation in the compressibility of the substrate adjacent [at least one of a size and location of] the areas of increased sensitivity to [shape] determine the spectral response of the [piezoelectric continuous line] array.

7. [Amended] The piezoelectric sensor of claim 1 [2] further comprising:

a variation in a ratio of the total surface area of the areas of increased sensitivity to the total surface area of the relatively incompressible substrate to shape the beam pattern of the [piezoelectric continuous line] array.

8. [Twice Amended] The piezoelectric sensor of claim 1 [2] further comprising:

a variation in a ratio of the total surface area of the areas of increased sensitivity to the total surface area of the relatively incompressible substrate [are varied] to determine the spectral response of the piezoelectric continuous line array.

9. [Twice Amended] The piezoelectric sensor of claim 1 further comprising:

[a shape of the continuous line array formed to determine a beam pattern of the continuous line array] [wherein the piezoelectric film adjacent the areas of relatively compressible substrate generate an electrical signal substantially larger than the piezoelectric film adjacent the areas of relatively incompressible substrate.] a variation in the ratio of the total surface area of the areas of increased sensitivity to the total surface area of the relatively incompressible substrate to determine the noise reduction for the array.

10. [Amended] The piezoelectric sensor of claim 3 further comprising:

a two dimensional shape of the [continuous line] array formed to determine the spectral response of the [continuous line] array.

24. (new) A method for [for] detecting acoustic seismic data on a single element piezoelectric sensor comprising:

placing a continuous piece of uninterrupted piezoelectric film forming a single piezoelectric element on a surface of a relatively incompressible substrate, wherein the piezoelectric film adjacent the relatively incompressible substrate generates an electrical signal substantially sensitive to compression of the piezoelectric film only;

forming a plurality of areas of relatively compressible substrate formed in the surface of the relatively incompressible substrate adjacent areas within the continuous uninterrupted piezoelectric film, wherein the [area] plurality of areas within the continuous uninterrupted piezoelectric film adjacent the areas of relatively compressible substrate form an array of enhanced sensitivity areas wherein an electrical output of the entire array may be observed with a single pair of connectors [generate an electrical signal substantially sensitive to stretching of the piezoelectric film adjacent the relatively compressible substrate]; and

connecting a single pair of connectors to provide [a single] to access the electrical output [from the single piece of piezoelectric film forming] from the array [the plurality of discrete areas of increased sensitivity].

25. [amended] The method of claim 24 further comprising:

forming a beam pattern for the [sensor] array by adjusting the relationship between the shapes and configuration of the areas relatively incompressible substrate and the areas of relatively compressible substrate adjacent the single piece of piezoelectric film.

26. [amended] The method of claim 24, further comprising:

forming a two-dimensional array of areas of relatively compressible substrate formed in the surface of the relatively incompressible substrate to create a two-dimensional continuous line array of areas of increased sensitivity in the piezoelectric film to impinging acoustic pressure waves having a shapeable beam pattern.

27. [amended] The method of claim 26, further comprising:

forming the two-dimensional continuous line array of areas of increased sensitivity into a three-dimensional shape to form a three-dimensional continuous line array of areas of increased sensitivity to impinging acoustic pressure waves in the piezoelectric film having a shapeable beam pattern.

28. [amended] The method of claim 25 further comprising:

varying a [size or] location of an area of increased sensitivity to shape the beam pattern of the [piezoelectric continuous line] array.

29. [amended] The method of claim 25 further comprising:

varying a size [or location] of an area of increased sensitivity to shape the spectral response of the piezoelectric continuous line array.

30. [amended] The method of claim 25 further comprising:

varying a ratio of [the] a total surface area of the areas of increased sensitivity to the total surface area of the relatively incompressible substrate to shape the beam pattern of the [piezoelectric continuous line] array.

31. [amended] The method of claim 25 further comprising:

varying [variation in] a ratio of a [the] total surface area of the areas of increased sensitivity to the total surface area of the relatively incompressible substrate are varied to determine the spectral response of the piezoelectric continuous line array.

32. [amended] The method of claim 25 further comprising:

[wherein the piezoelectric film adjacent the areas of relatively compressible substrate generate an electrical signal substantially larger than the piezoelectric film adjacent the areas of relatively incompressible substrate.] varying at least one of the size, shape or configuration of the sensitive areas in the array to determine a noise level.

33. [amended] The method of claim 26 further comprising:

shaping of the areas forming the [continuous line] array to determine the spectral response of the continuous line array.